translation prepared by Hanna Stoeckenius, folder 13, box 2, RU 518, Rockefeller University Archives, RAC, p. 125).

Many investigators responded to Altmann's reports of granules with great skepticism, raising doubts in particular about his reliance on fixatives such as osmic acid. The comments of William Bate Hardy are illustrative:

> It is notorious that the various fixing reagents are coagulants of organic colloids, and that they produce precipitates which have a certain figure or structure. It can also readily be shown . . . that the figure varies, other things being equal, according to the reagent used. It is therefore cause for suspicion when one finds that particular structures which are indubitably present in preparations are only found in cells fixed with certain agents, used either alone, or in particular formulae. Altmann demonstrates his granules by the aid of an intensely acid and oxidizing mixture. (Hardy, 1899; quoted in Fruton, 1972, p. 389)

Fischer (1899) cast further doubt on the reality of the granules by showing that by applying commonly used fixing agents, especially osmium, to various homogeneous protein solutions (e.g., egg whites and gelatins, which would not contain subcellular structures, he could produce a variety of granular and filamentous structures. In part to counter charges of methodological artifact, Altmann also pioneered an alternative technique to chemical fixation, freeze-drying, which, while very laborious, provided an independent basis for evaluating the reality of the structures revealed by chemical fixation. This, however, did not suffice to stop the objections from the critics.

Carl Benda (1898; 1899), employing crystal violet as a stain, observed Altmann's structures and proposed the named *mitochondria*, from the Greek words for thread and granule. The name reflected the fact that in his preparations they sometimes appear threadlike and at other times more granular.[19] Importantly, Benda provided evidence that these structures could be seen both in fixed and in living cells, reducing the plausibility of the objection that they were an artifact of fixation. Further, Michaelis (1899) showed that the dye Janus Green (diethylsafraninazodimethylanalin), which appears blue-green when oxidized but colorless when reduced, would turn mitochondria blue-green in living cells. This suggested that mitochondria had the capacity to oxidize substrates and provided the first clue as to their role in cellular respiration.

[19] These different appearances, we now understand, depended upon the angle at which the mitochondrion was sliced in preparing the slide. The term *mitochondrion* only gradually became accepted. Some other terms were blepharoblast, condriokonts, chondriomites, chondrioplasts, chondriosomes, chondriosheres, fila, fuchsinophilic granules, interstitial bodies, Körner, Fädenkörner, mitogel, parabasal bodies, plasmasomes, plastochondria, plastomes, sphereoplasts, and vermicles.